Every Learner Inquires

Goals

- Student Learning Goal – Improve science learning for all K-12 students in Iowa
- Teacher Learning Goal – Build teacher leadership and content expertise
- Teacher Practice Goal – Implement inquiry-based instruction
- Organizational Goal – Establish a structure that sustains the implementation of Every Learner Inquires

Vision

The vision of ELI is one in which all students engage in investigating scientific questions in supportive, collegial learning communities. Students will come to deeply understand important science ideas and master complex skills and reasoning processes that are essential to scientific literacy.

Mission

The mission of the ELI project is to assist Iowa's AEAs, schools, and districts in building the capacity to implement an effective K-12 science education program using inquiry-based instructional strategies as outlined in the *National Science Education Standards.*

Outcomes

As a result of participating in the ELI program, Leadership Teams will:

- Develop fundamental understandings about scientific inquiry
- Understand and support the implementation of inquiry-based strategies in the classroom
- Learn to assess students' science learning using formative and summative assessments
- Establish a professional learning community with a collective focus on student learning, reflective dialog, and professional collaboration
- Understand and apply the research on organizational change and professional development

Definition of Scientific Inquiry

Scientific Inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from this work. Inquiry also refers to activities of learners in which they develop knowledge and understanding of scientific ideas, as well as understanding about how scientists study the natural world. Current research indicates that, although they rarely discover knowledge that is new to humankind, learners engaged in inquiry discover knowledge that is new to them.

Scientific inquiry is multi-faceted. It involves making observations; posing questions; examining multiple sources of information to see what is already known in light of experimental evidence; using tools to gather, analyze, and

interpret data; and communicating results. Inquiry also identifies assumptions, uses critical and logical thinking, and considers alternative explanations.

Essential Features of Classroom Inquiry

- Learners engage in scientifically oriented questions
- Learners give priority to evidence, which allows them to develop and evaluate explanations that address scientifically oriented questions
- Learners formulate explanations from evidence to address scientifically oriented questions
- Learners evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding
- Learners communicate and justify their proposed explanations

5E Learning Cycle

The 5E Learning Cycle is based on the Atkin and Karplus learning cycle developed in the 1960s and originally founded on Piagetian theory. The Karplus model used the terms exploration, invention, and discovery to describe the phases of the learning cycle. These were later modified to exploration, term introduction, and concept application.

In the 5E model presented in ELI, phases to engage learners' prior experiences and evaluate understanding have been added.

The 5E Learning Cycle consists of the following phases:

Engagement – Learners experience questions and activities that engage prior knowledge of major concepts and abilities in the domain of instruction

Exploration – Learners express prior knowledge and investigate the efficacy of their understanding and abilities

Explanation – Learners are introduced to scientific facts, concepts, and abilities

Elaboration – Learners apply their newly formulated understanding and abilities

Evaluation – Learners' attainment of primary outcomes of instructional sequence are assessed

Leadership Teams

Each Area Education Agency has assembled a leadership team comprised of AEA science consultants, other AEA consultants (special education, technology, etc.), representatives from institutes of higher education, and teacher leaders from school districts in their areas. These leadership teams reflect the long-term capacity building priorities of each agency, and will be responsible for providing professional development in their areas in years three and four of the initiative. Team members follow one or both of the grade level strands.

Case Study Schools
All science education staff and administrators from four case study schools are participating in the ELI training. These participants will be providing data that will show the effectiveness of the professional development and implementation of inquiry strategies as well as the impact of the implementation on student learning. The four case study schools are Harlan High School, Harlan, Iowa; Perkins Academy, Des Moines, Iowa; Mechanicsville Elementary School, Mechanicsville, Iowa; and Lincoln Elementary School, Washington, Iowa.

ELI Instructional Staff
Jeanne Bancroft is a science consultant with Grant Wood AEA, providing professional development and consultative services to science teachers across the seven county, 33 district attendance areas. She coordinates the Van Allen Science Teaching Center, which provides research-based curriculum and professional development to over 1000 K-8 science teachers and is a member of the Project SMARTS (a K-6 science and math professional development project) and Project SMILE (a middle school professional development project) instructional staffs. Bancroft coordinates the work of the Iowa Department of Education's Science Content Network. She has served on the planning, design and instructional teams for Every Learner Inquires. Prior to her work as a professional developer, she worked for more than 20 years as a classroom teacher.

Shannon C'de Baca is a nationally recognized educator and the host of the Annenberg/PBS television series "the Missing Link in Mathematics". She also serves as a "star" teacher and writes for the PBS science series "NOVA". Ms. C'de Baca has taught high school science for the past 27 years, often using her classroom as a living laboratory to implement the innovations and research-based strategies she shares on a national level. She currently teaches on-line chemistry classes for Iowa Learning Online. She has an "in-the-trenches" view that resonates with teachers. Ms. C'de Baca has served as a consultant for the National Center for Education and the Economy, the Public Broadcasting Corporation, the Council of Chief State School Officers, the National Education Association, the National Science Teachers' Association, the Department of Energy, and the United States Department of Education. She has also played a key role in the development of state and national standards documents for science. Ms. C'de Baca has received awards from the Milken Family Foundation, Sertoma International, the Iowa Department of education, and NSTA for her classroom work. She currently serves as the U.S. Citizen Ambassador of Education for the Department of State to Bahrain.

Erica Larson, Ph.D., is a Grant Wood AEA science consultant. She is currently co-directing an Inquiry Institute, which is supporting 60 area teachers to effectively implement inquiry in their classrooms. She was a member of the Project SMILE (a middle school professional development project) instructional

staff and currently serves as project coordinator for the SMARTS Project, an MSP professional development grant project that targets K-6 science and mathematics teachers. Larson taught high school science for 20 years and has served on the Board of the Iowa Academy of Science (IAS) and is past president of the Iowa Science Teachers' section of IAS. She is currently serving the Iowa Academy of Science as the president-elect.

Kathy McKee is the science consultant for the Iowa Department of Education. In this position, she coordinates the Every Learner Inquires initiative, the Math/Science Partnerships program, the Presidential Awards for Excellence in Mathematics and Science Teaching and other science programs. She is responsible for environmental education programs, spearheading the "Using The Environment as an Integrating Context for Learning (EIC)" model, and working with state environmental organizations in their efforts. Prior to joining the Department of Education in 2000, McKee taught for 25 years, teaching 2nd, 3rd, kindergarten and 5th grade in Cedar Falls and 6th grade science in Waterloo; serving as science teacher and science magnet coordinator at King-Perkins Science Magnet School in Des Moines; and teaching 7th and 8th grade science and environmental studies and serving as talented and gifted coordinator at Hoyt Middle School in Des Moines. She has also taught science methods classes at Grandview College and Drake University.

Chris Rohret is a Staff Development facilitator for the Iowa City Community School District. Rohret has a total of 34 years of teaching experience as an elementary classroom teacher and as a teacher in Iowa City's gifted education program. In response to Iowa's Teacher Quality legislation, she collaborated with colleagues to design a teacher-mentoring program for the Iowa City Schools. She received a master's degree in science education and a K-12 gifted endorsement from the University of Iowa. Rohret has experience with staff to differentiate curriculum and develop concept-based science curriculum. She has worked collaboratively with school leadership teams to develop professional learning communities and design meaningful, research-based professional development.

ELI Resource Staff

Harold Pratt is a private consultant working in all areas of science education. He currently is a Disciplinary Literacy Fellow in Science and Learning Research at the University of Pittsburg. He has had extensive administrative and curriculum development experience at the local and national levels, and has co-authored or directed the development of three science textbooks, a book on educational leadership, and published numerous articles and book chapters. He is a Fellow of the American Association for the Advancement of Science, was the first recipient of the National Science Education Leadership Association's "Nation's Outstanding Science Supervisor" award, was president of the National Science Teacher's Association and received NSTA's Distinguished Service to Science teaching award.

Jody Bintz is a science educator with the Biological Sciences Curriculum Study Center for Professional Development in Colorado Springs where she leads the BSCS National Academy for Curriculum Leadership. She also works with the Southwest Pennsylvania Mathematics and Science Partnership and is a Fellow with the Science Disciplinary Literacy team, which is part of the Institute for learning at the University of Pittsburg. Jody taught high school in Treynor, Iowa for 13 years prior to joining AEA 13 as science and school improvement consultant. She served on the Iowa Support Team for Schools in Need of Improvement and is a member of the Iowa Mathematics and Science Coalition Governing Board.

Nancy Landes, Ph.D., currently serves as the Director of the BSCS Center for Professional Development. She has been an elementary teacher and curriculum developer. At BSCS she has served as the project director for two major curriculum development projects – Science for Life and Living: Integrating Science, Technology and Health and BSCS Science T.R.A.C.S., both in elementary science education. In her role as Director of Professional Development, Dr. Landes oversees the professional development efforts at BSCS, including the National Academy for Curriculum Leadership and work on the PROM/SE project with Michigan State University. She has worked with the National Science Teachers' Association to develop inquiry-based professional development materials and strategies.

Participating Agencies

AEA 1 – AEA consultants, representatives from Clarke College; Sumner-Fredericksburg CSD; Dubuque CSD; St. Patrick's School, Waukon; West Delaware CSD

AEA 267 – AEA consultants, representatives from the University of Northern Iowa, North Iowa Area Community College, Charles City CSD, St. Ansgar CSD, Waverly-Shell Rock CSD, Marshalltown CSD, Independence CSD, Sumner CSD

NWAEA – AEA consultants, representatives from Dordt College, Sioux City CSD, Sioux Center CSD, South O'Brien CSD

AEA 8 – AEA consultants, representatives from Storm Lake CSD. Eagle Grove CSD

AEA 9 – AEA consultants, representatives from Davenport CSD, Calamus-Wheatland CSD

AEA 10 – AEA consultants, representatives from Iowa City CSD, Cedar Rapids CSD, College Community CSD

AEA 11 – AEA consultants, representatives from West Des Moines CSD, Des Moines CSD, Earlham CSD, Ames CSD

AEA 13 – AEA consultants, representatives from Treynor CSD, Glenwood CSD, Council Bluffs CSD, Atlantic CSD, Tri-Center CSD

AEA 14 – AEA consultants, representatives from East Union CSD, Nodaway Valley CSD, Mt. Ayr CSD, Corning CSD, Murray CSD

AEA 15 – AEA consultants, representatives from Chariton CSD, Sigourney CSD, Harmony CSD, North Mahaska CSD, Fairfield CSD, Ottumwa CSD

AEA 16 – AEA consultants, representatives from Fort Madison CSD; Holy Trinity School, Fort Madison

Case Study Schools
Harlan CSD
Des Moines Public Schools
North Cedar CSD
Washington CSD

Every Learner Inquires Implementation Schedule

K-12 Summer Institute
July 31- August 3, 2006, Jester Park, Granger, IA

K-6 2006-7 Academic Year Seminars, sites – Iowa City Sheraton; Swan Lake State Park, Carroll

East	**West**
9/14/06	9/18/06
11/8/06	11/6/06
1/19/07	1/17/07
2/20/07	2/22/07
4/18/07	4/16/07

7-12 Academic Year Seminars, sites – Iowa City Sheraton; Swan Lake State Park, Carroll

East	**West**
9/20/06	9/22/06
11/8/06	11/6/06
1/9/06	1/11/06
2/6/06	2/8/06
4/18/06	4/16/06